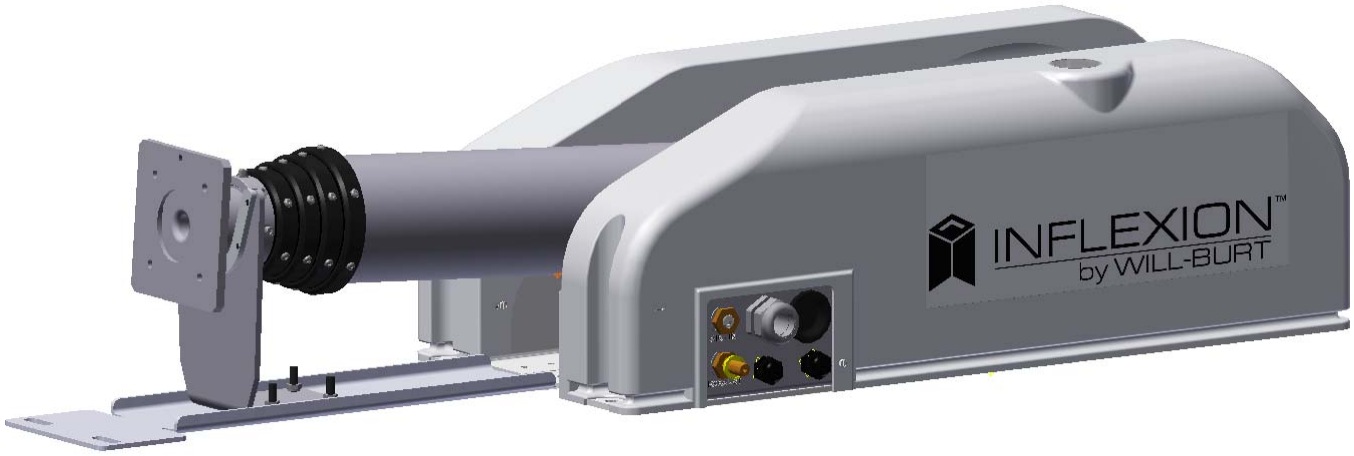
INFLEXION™ 2.3, 4.5, 6.0 & 7.5
INSTALLATION, OPERATION & MAINTENANCE MANUAL

INFLEXION™



The Will-Burt Company
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TP-4976401-B, January 2014

Inflexion™ Warranty

Will-Burt warrants its Inflexion™ masts to be free from defects in material and workmanship for a period of two (2) years, with such time period running from the date of shipment by Will-Burt. Will-Burt shall not be responsible for any damage resulting to or caused by its products by reason of failure to properly install, maintain or store the product; use of the product in a manner inconsistent with its design; unauthorized service, alteration of products, neglect, abuse, accident, or acts of God,. This warranty does not extend to any component parts not manufactured by Will-Burt; provided, however, Will-Burt's warranty herein shall not limit any warranties by manufacturers of component parts which extend to the buyer.

THE FOREGOING WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, AND NO REPRESENTATIONS, GUARANTEES OR WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO, A WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT ARE MADE BY WILL-BURT IN CONNECTION WITH THE MANUFACTURE OR SALE OF ITS PRODUCTS. NO EMPLOYEE, DISTRIBUTOR, OR REPRESENTATIVE IS AUTHORIZED TO CHANGE THIS WARRANTY IN ANY WAY OR GRANT ANY OTHER WARRANTY ON BEHALF OF WILL-BURT.

Claims for defects in material and workmanship shall be made in writing to Will-Burt within thirty (30) days of the discovery of defect. Failure to provide notice as required hereby shall be conclusive evidence that the product was in conformity with the warranty, and Will-Burt shall be released from any and all liability relating to the product. Will-Burt may either send a service representative or have the product returned to its factory at Buyer's expense for inspection. If judged by Will-Burt to be defective in material or workmanship, the product will be replaced or repaired at the option of Will-Burt, free from all charges except authorized transportation.

THE REMEDIES OF BUYER SET FORTH HEREIN ARE EXCLUSIVE AND ARE IN LIEU OF ALL OTHER REMEDIES. THE LIABILITY OF WILL-BURT WHETHER IN CONTRACT, TORT, UNDER ANY WARRANTY, OR OTHERWISE, SHALL NOT EXTEND BEYOND ITS OBLIGATION TO REPAIR OR REPLACE, AT ITS OPTION, ANY PRODUCT OR PART FOUND BY WILL-BURT TO BE DEFECTIVE IN MATERIAL OR WORKMANSHIP. WILL-BURT SHALL NOT BE LIABLE FOR COST OF INSTALLATION AND/OR REMOVAL, OR BE RESPONSIBLE FOR DIRECT, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES OF ANY NATURE.

Document History

Manual	Version	Date	Remarks
TP-4976401	00	11/12/2013	INITIAL RELEASE
	A	12/3/2013	Updated warranty page.
	B	01/06/14	Clarify power requirements (section 1.6), emergency stow procedure (section 3.2)

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SAFETY SUMMARY

SIGNAL WORD DEFINITION

Per the ANSI Z535.4 standard, the following signal words and definitions are used to indicate hazardous situations:

⚠ DANGER

DANGER indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury.

⚠ WARNING

WARNING indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.

⚠ CAUTION

CAUTION indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury. It is also used to alert against unsafe practices.

GENERAL SAFETY PRECAUTIONS

The following are general safety precautions that are not related to any specific procedures and therefore do not appear elsewhere in this publication. These are recommended precautions that personnel must understand and apply during many phases of operation and maintenance.

⚠ DANGER

Electrocution Hazard! Contact with high voltage will result in death or serious injury. Observe general safety precautions for handling equipment using high voltage. Do not locate or operate mast near electrical lines, cables or other unwanted sources of electricity. Do not operate mast in lightning. Be certain electrical cables are undamaged and properly terminated. Always disconnect power before performing service, repair or test operations.

⚠ WARNING

Safety Instruction - Read Manual! Failure to follow operating instructions could result in death or serious injury. Read and understand the operator's manual before using the mast.

⚠ WARNING

Tip Over Hazard! Mast tip over could result in death or serious injury. Do not operate in high winds. Operate on level ground only. Stand clear of mast and mast payload during operation. Be certain mast is level and secure before and during installation, operation and maintenance.

⚠ WARNING

Safety Instruction - Trained Personnel Only! Death or serious injury could result if proper inspection, installation, operation and maintenance procedures are not observed. Installation, operation and maintenance to be performed by trained and authorized personnel only. Proper eye protection should be worn when servicing the mast.

⚠ WARNING

Health and Safety Hazard! Solvent used to clean parts is potentially dangerous. Avoid inhalation of fumes and also prolonged contact to skin.

⚠ WARNING

Safety Instruction-Do not look at lights! Do not look directly into lights when they are illuminated. Temporary impairment or permanent vision damage could occur.

SPECIFIC SAFETY PRECAUTIONS

The following are safety precautions that are related to specific procedures and therefore appear elsewhere in this publication for emphasis. These are recommended precautions that personnel must understand and apply during specific phases of installation, operation and maintenance.

⚠ WARNING

Safety Instruction-Operation! For outdoor use only. Do not use in areas that have been classified as hazardous as defined in Article 500 of the National Electric Code.

⚠ WARNING

Crush Hazard! Death or serious injury could result if mast fails suddenly. Do not stand directly beneath the mast or its payload. Be certain payload is properly installed and secured.

⚠ WARNING

Burst Hazard! Over pressurizing mast will trip safety valve and could result in death or serious injury. Do not exceed maximum operating pressure of 20 psi (138 kPa) for Standard Duty masts. Keep personnel clear of safety valve exhaust direction.

⚠ WARNING

Fire Hazard! Cleaning solvent, used for maintenance, is flammable and can be explosive resulting in death or serious injury. Do not smoke. Use cleaning solvent in a well-ventilated area. Keep cleaning solvent away from ignition sources. Always store cleaning solvent in the proper marked container.

⚠ WARNING

Relocation Hazard! Relocating the mast during operation or after being raised could result in death or serious injury. Do not relocate the mast during operation or while raised. This applies especially to masts mounted to vehicles. Operate the mast only if the vehicle is stationary and the vehicle engine is off.

⚠ WARNING

Mounting Structure Hazard! Mounting mast into a structure unable to resist the forces generated from customer-specific loading scenario could result in death or serious injury and could damage the mast. Before operation, be certain mounting structure is capable of resisting forces generated from all loading and environmental conditions, including, but not limited to, mast size and weight, payload size and weight, sail size, wind speed, guy line arrangement, support bracket or roof line location and base plate assembly.

⚠ WARNING

Electrocution Hazard! Do not touch live wires. Death or serious injury could result.

⚠ WARNING

Safety Instruction – Operation! Make sure all power has been disconnected prior performing maintenance.

⚠ WARNING

Safety Instruction -Trained Personnel Only! Only trained and qualified personnel should perform installation, adjustments, and servicing. Only a properly trained and qualified certified electrician should perform electric installations and service.

⚠ WARNING

When relamping an installed fixture, make sure all power to fixture is off and that the fixture is cool

⚠ WARNING

Safety Instruction – Operation! At all times prior to mast operation, insure that:

1.) The mast area is free of personnel and mechanical obstruction;
2.) All electrical cables are undamaged and properly terminated;
3.) The operator must have full view of the mast during use;
4.) Any transit tie-downs on the payload have been removed;
5.) The vehicle is not moving;
6.) The area above the mast is free of mechanical obstructions.

⚠ CAUTION

Safety Instruction-Operation! Lamps are extremely hot and should not come into contact with people or combustible and/or explosive materials. Do not operate if breakage occurs or unit is knocked over.

⚠ CAUTION

Entanglement Hazard! Tangled cables can cause equipment damage. Ensure control cables are not tangled and are free to pay out as mast is raised.

⚠ CAUTION

Safety Instruction – Operation! Do not operate the mast during an electrical storm.

⚠ CAUTION

Lifting Hazard! Manually lifting over 55 lb (25kg) is prohibited. In the UK, all lifting equipment must be thoroughly examined annually by a competent person according to the Lifting Operations and Lift Equipment Regulations 1998. Equivalent regulations exist in other EU states.

⚠ CAUTION

Safety Instruction – Operation! All operators must read the Operation section of this manual and be properly trained.

CHAPTER 1
INTRODUCTION

1.1 SAFETY PRECAUTIONS

Refer to the Safety Summary for precautions to be observed while operating or servicing this equipment.

1.2 DOCUMENT INTRODUCTION

This document covers installation, operation, maintenance, and troubleshooting for the INFLEXION masts. The manual should be reviewed in its entirety. Contact the Will-Burt factory with any questions before performing any procedures outlined in this manual. The INFLEXION™ 1.5, 2.3, 4.5, 6.0, and 7.5 masts will be referred to as the "INFLEXION" mast in this manual.

1.3 INFLEXION DESCRIPTION

The INFLEXION mast is a transportable platform elevation system which serves as a platform for communications antennae, camera, and other payloads. The unit is designed for installation on any vehicle for the purpose of providing temporary communications, or surveillance. See Figure 1-1 for identification of the major components of the INFLEXION mast.

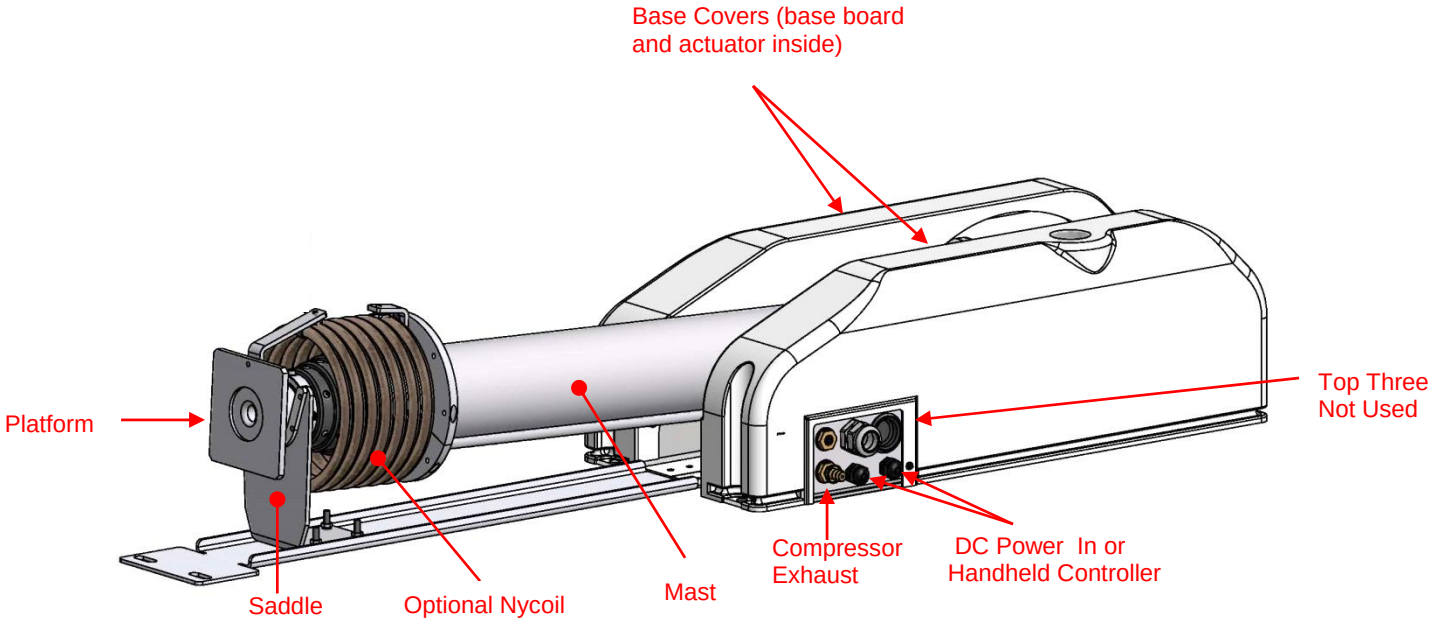
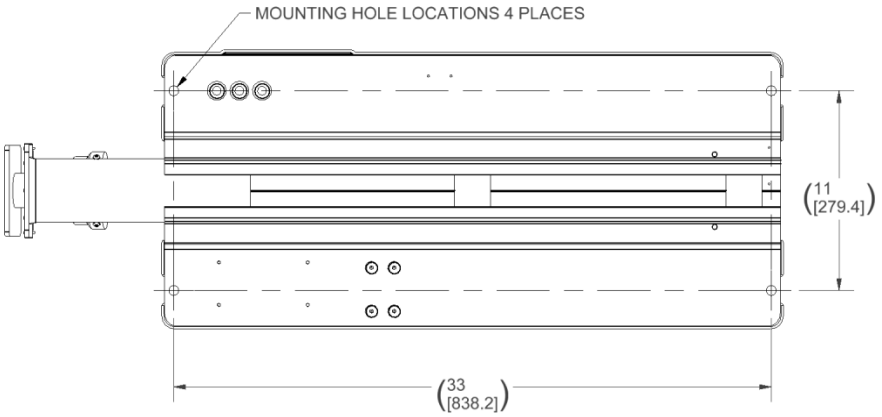


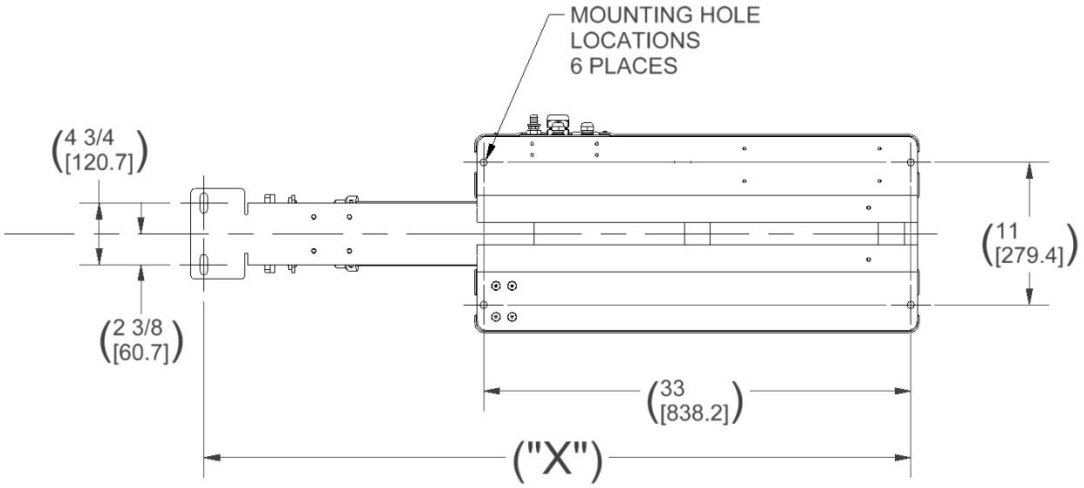
Figure 1-1 INFLEXION Mast Major Components (INFLEXION 4.5, model 720378040 shown)

1.4 DIMENSIONS

Dimensions and mounting hole locations for INFLEXION are shown. Please refer to product literature or www.willburt.com for additional information including length, width and height information.



INFLEXION 2.3



INFLEXION 4.5, 6.0, 7.5

MODEL	DIM "X" inch [mm]
4.5 METER	66 5/8 [1692.3]
6.0 METER	79 7/8 [2028.8]
7.5 METER	94 3/8 [2397.1]

Figure 1-2 INFLEXION 4.5 Model Number 722069001 Dimensions

1.5 MAST LOAD

It is important that the mast be securely mounted to a sturdy platform, which will not overturn during operational loading of the mast. Following is the loading information for the mast, which can be expected during operation:

- 75 lb at saddle of mast (Inflexion 1.5 and 2.3) or 120 lb saddle of mast (Inflexion 3.0, 4.5, 6.0, and 7.5)
- 200 lb at the front of the base cover
- 575 lb at rear of base cover (mast pivot)

1.6 POWER REQUIREMENTS

DC power for the INFLEXION is supplied by the vehicle and customer-wired to the mast base board. The INFLEXION operates at 12 VDC, but will accept 24 VDC with the optional 24/12 converter. The DC cables should be 12 gauge (for 12V) and 16 gauge (for 24V). Long runs of cable can introduce power loss. There is a 35-40 amp inrush to the motor (depending on the length and gauge of the wires) that drops to 6-7 amps in 300mS. For long runs, it may be necessary to increase the wire gauge of the cables. If required, the vehicle-integrator is responsible for installing an ON/OFF switch to disconnect power from the unit. This switch should be in line with the positive power cable (from battery source). If using a separate power supply, it should have a 10 amp minimum.

CHAPTER 2
INSTALLATION

⚠ WARNING

Safety Instruction -Trained Personnel Only! Only trained and qualified personnel should perform installation, adjustments, and servicing. Only a properly trained and qualified certified electrician should perform electric installations and service.

⚠ WARNING

Safety Instruction -Trained Personnel Only! Only trained and qualified personnel should perform installation, adjustments, and servicing. Only a properly trained and qualified certified electrician should perform electric installations and service.

⚠ CAUTION

Lifting Hazard! Manually lifting over 55 lb (25kg) is prohibited. In the UK, all lifting equipment must be thoroughly examined annually by a competent person according to the Lifting Operations and Lift Equipment Regulations 1998. Equivalent regulations exist in other EU states.

⚠ CAUTION

Safety Instruction – Installation! The INFLEXION should be installed on a location that is out of reach from unauthorized personnel.

2.1 INTRODUCTION

The INFLEXION has been designed to provide for ease of installation. This section of the manual provides the procedures that must be followed to ensure a successful installation. Be sure to read and understand the entire installation procedure before you begin.

2.2 TOOLS AND MATERIALS REQUIRED FOR INSTALLATION

Table 2-1 provides a list of tools and materials required to install and test the INFLEXION.

Wrenches	Crimping tool or Solder set
Screwdrivers	Wire cutter/stripper
½ inch or M12 Mounting Hardware (6 each)	Multimeter (to verify power is turned OFF)
Torque wrench	Clean Shop Rags
Drill	
Hoist (minimum 250 lb capacity)	

Table 2-1 Tools and Materials Required for Installation

2.3 UNPACKING

Unpack the INFLEXION as follows:

1. Carefully open and remove all parts from shipping container.
2. Lift the unit from the shipping container by the base tube at the center of gravity of the mast shown by the symbol.
3. Inspect for any shipping damage. If damage has occurred, notify carrier.
4. Be sure that all components are included and that the required tools are readily available.

2.4 ATTACHING TO VEHICLE

If the INFLEXION is mounted in a well on a vehicle, be certain that adequate drainage is provided. A minimum of (4) drain holes (one per corner) at least half inch in diameter is recommended to be drilled in the well around the unit so that water drains out of the well. While the unit has been designed to withstand adverse environmental conditions, it cannot be submerged.

9/16" bolt holes will be needed to mount mast (Figure 2-1) to the vehicle. It is important that the surface be flat such that the saddle and base plate are in the same plane. The areas to which the unit is mounted must be reinforced to withstand operating loading. Torque all hardware as appropriate for its material and size. There are (3) unplugged strain relief holes in the side of the base for cable entry.

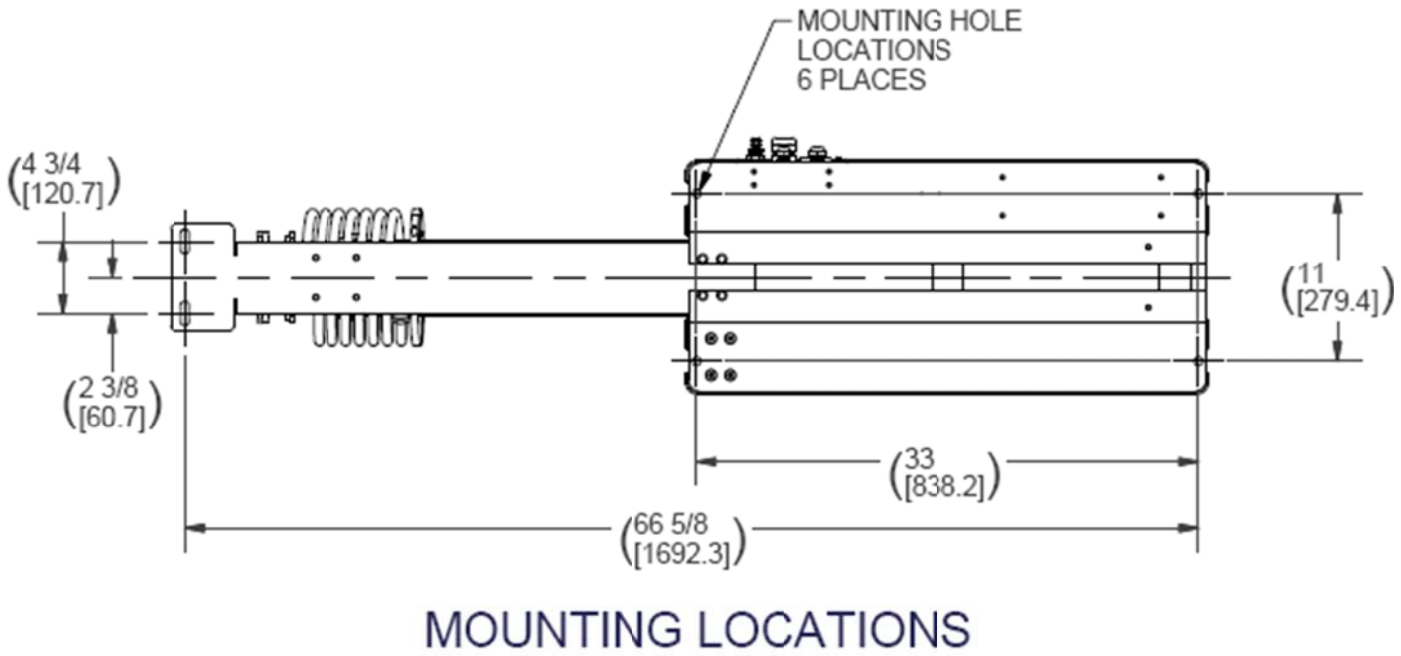
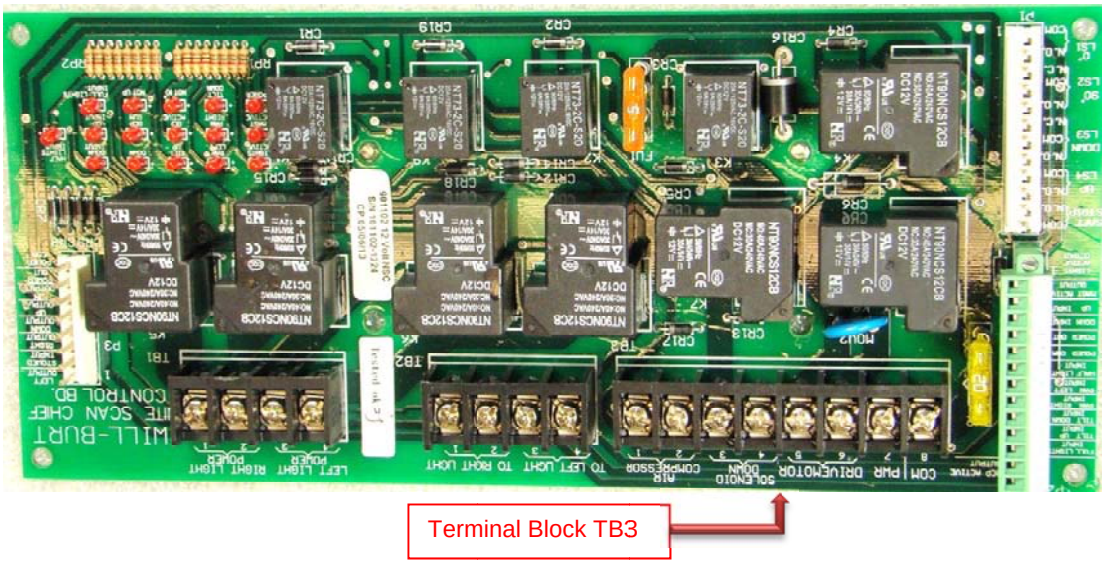


Figure 2-1
INFLEXION 4.5 Mounting Hole Pattern Shown
See section 1.4 for other hole patterns.

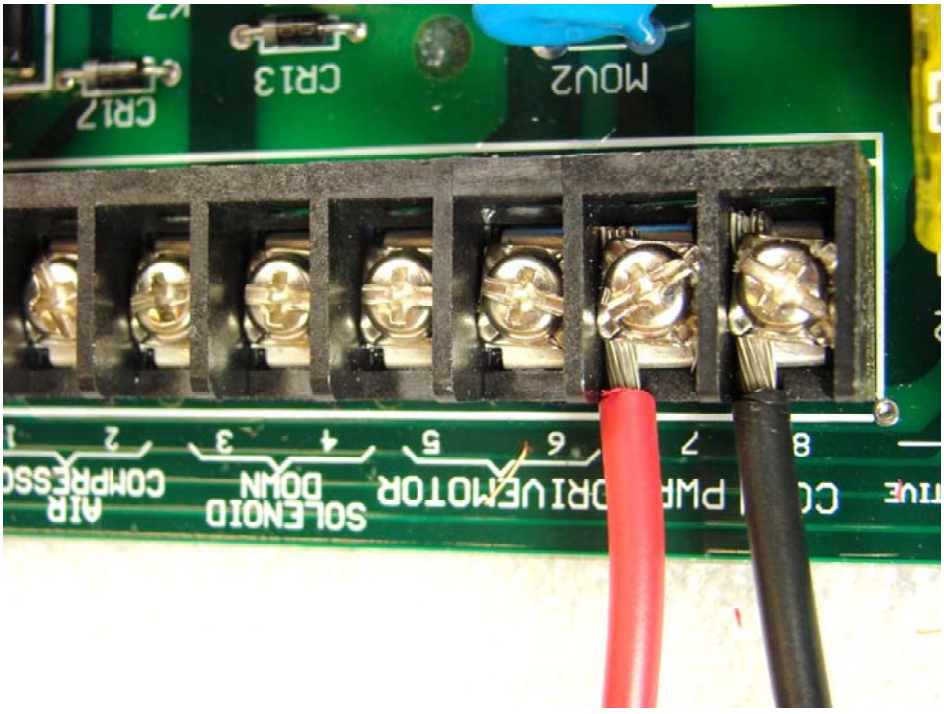
2.5 CONNECTING DC POWER TO THE BASE

1. From the customer supplied 12 VDC power supply, run the red and black 12V DC power wires through one of the strain reliefs in the side of the base. Ensure the cables are at least AWG 12 and no longer than 50ft from the power supply to the base board.

2. Locate terminal block TB3.



3. Connect the positive, red, 12 VDC cable to 7 PWR and connect the negative, black, cable to 8 COM.



4. Upon receipt of the INFLEXION, the hand-held controller should already be wired to the green base board connector.

2.6 PRE-OPERATIONAL CHECK

⚠ WARNING

Before beginning installation, make certain that the area is free of overhead power lines and other unwanted sources of electricity. Follow OSHA safety regulations when working near energized power lines. Be sure to allow sufficient clearance on all sides of mast to allow for side sway.

⚠ WARNING

This mast is for outdoor use only. Do not use in areas that have been classified as hazardous as defined in Article 500 of the National Electric Code.

⚠ WARNING

Do not use in the presence of flammable gases or liquids such as paint, gasoline or solvents. Do not use in areas of limited ventilation or where high ambient temperatures are present. Contact with combustible materials can cause ignition resulting in fire or explosion.

Before operating the INFLEXION, be sure that there are no overhead obstructions and that there are no power lines within 20 feet of the mast. Visually inspect the unit for any damage. If damage is apparent, do not use the mast. Have it serviced prior to use. Check for any objects which might obstruct motion of the mast or cause binding. Remove any material that may hinder mast function.

2.7 FUNCTIONAL TESTS

To test the installation, proceed as follows. If any part of the testing fails, check the LEDs on the base board as described in Section 4.4:

1. Check for proper clearance above the mast.

2. Press and hold the “Mast Up” button until the mast is fully deployed. The mast should raise to 90^{o} then go fully deployed. There is no Auto-up feature.

3. Release the “Mast Up” button. Press and hold the “Mast Down” button. The mast should lower to 90^{o} then stow and turn power off. There is no Auto-stow feature.

CHAPTER 3
OPERATING INSTRUCTIONS

⚠ WARNING

All operators must read the Operation section of this manual and be properly trained.

⚠ WARNING

Keep personnel clear of mast while during operation.

⚠ WARNING

For outdoor use only. Do not use in areas that have been classified as hazardous as defined in Article 500 of the National Electric Code.

⚠ WARNING

Do not use in the presence of flammable gases or liquids such as paint, gasoline or solvents. Do not use in areas of limited ventilation or where high ambient temperatures are present. Contact with combustible materials can cause ignition resulting in fire or explosion.

⚠ WARNING

Before operating, make certain that the area is free of overhead power lines and other unwanted sources of electricity. Be sure to allow sufficient clearance on all sides of mast to allow for side sway.

⚠ WARNING

Do not move vehicle until mast has been securely stowed.

3.1 GENERAL MAST OPERATION

The mast hand-held controller (Figure 3-1).has a momentary toggle switch and a cord that is wired into the baseboard. When the “Mast Up” button is pressed and held, the INFLEXION operates the DC powered actuator and drives the mast from the stowed position to the 90° position. Releasing the “Mast Up’ switch at any time stops mast motion. Note there is no Auto-up feature to automatically raise the mast to 90°. When at 90°, the 90° proximity switch detects the magnet in the actuator arm and stops further driving of the actuator. Pressing and holding the “Mast Up” switch will raise the mast until the mast is fully deployed and the mast up switch is sensed. When the mast up switch is sensed, air into the mast is stopped and the mast is left fully deployed.

To stow the mast, you must first ensure the payload is positioned to be stowed. There are no controls on the hand held remote to pan or tilt the payload. The payload may have to be manually positioned for stowing.

When the “Mast Down” button is pressed and held, the INFLEXION releases air from the mast and the mast lowers to the 90° position. Once the 90° sensor is reached and the “Mast Down” switch is held down, the electric actuator lowers the mast to the stowed position in the saddle. When the stow switch is sensed, the actuator stops. The INFLEXION remains powered until manually turned off.

Figure 3-1 Hand-held Controller

3.2 EMERGENCY STOW (LOSS OF POWER):

⚠ WARNING

Make sure all power has been disconnected from the INFLEXION prior to manually lowering mast.

In the event of power loss, the INFLEXION mast will vent and lower automatically but the mast will not return to its fully stowed horizontal position. If possible, this must be accomplished manually and must be done with extreme caution. It may be necessary to manually pan the payload so that when it is manually stowed, the payload does not make contact with the mounting surface or the saddle. Consult payload manufacturer to determine if best way to move the payload without power.

To emergency stow the mast, proceed as follows:

1. Remove the base access cover.
2. Make sure all power has been disconnected from the system by turning all breakers to the OFF position.
3. Ensure your payload is secure and may by safely lowered.
4. Remove the base cover.
5. Remove the 6mm Allen (set screw) on the end of the actuator cover (Figure 3-2 Emergency Stow Allen Screw Location).
6. Place a long 6mm Allen wrench into the hole to reach the 6mm Allen-head drive screw. A socket Allen wrench may be used but care must be taken not to damage the adjacent air compressor.
7. Turn the socket Allen wrench clockwise to lower the mast. Lower the mast until it seats firmly in the saddle.
8. Replace the 6mm Allen set screw.
9. Replace the right side base cover.

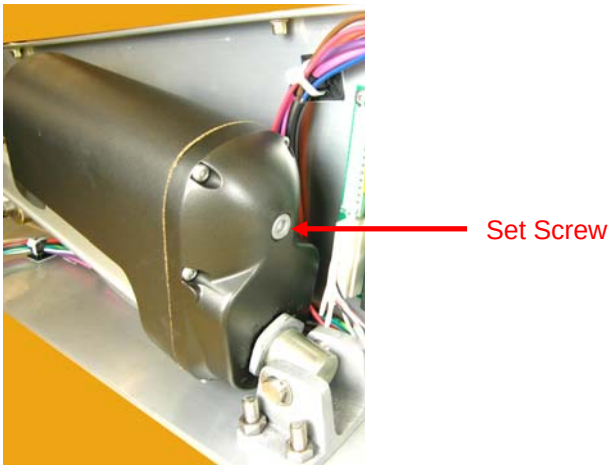


Figure 3-2 Emergency Stow Allen Screw Location

CHAPTER 4
MAINTENANCE AND SERVICE INSTRUCTIONS

4.1 INTRODUCTION

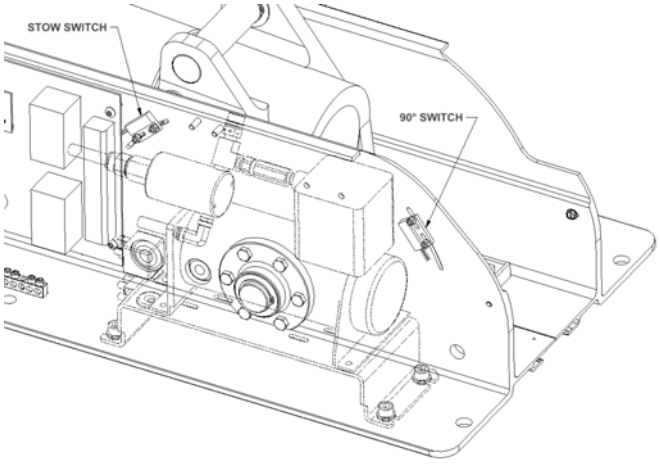
This section of the manual describes routine maintenance procedures and covers general service information.

4.2 CLEANING THE INFLEXION

The exterior of the INFLEXION base should be wiped down periodically to remove dirt and road grime using a soft cloth or sponge and a mild solution of soapy water.

4.3 ADJUSTMENTS

The proximity switches (Figure 4-1) are intended to stop the actuator when the mast is at 90° and when it is stowed. It senses the position of the mast as it rotates on the clevis assembly and signals the base circuit board to stop when the actuator is in the correct position.



NIGHTSCAN

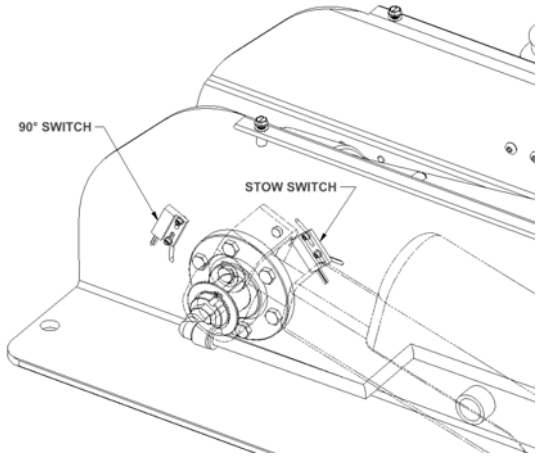


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Figure 4-1 Proximity Switches

Adjusting the 90° Proximity Switch

Before delivery of a new INFLEXION, all switches are properly set and tested and normally no switch adjustment is necessary. However, if the 90° switch needs adjusted, like after the actuator was replaced, follow these steps to adjust the 90° switch:

1. Make certain that the INFLEXION base is level.
2. Remove the base side cover.
3. Loosen the upper jam nut to lower the switch approximately 1/8".
4. Raise the mast to 90° by holding the "Mast Up" button until the mast is at 90°.
5. Check that the mast is at 90° by using a level and also ensuring that the mast is square to the sheet metal side plate on the base. A value in the range of 89.5° to 90.5° is acceptable.
6. Raise the 90° switch until it senses the actuator. This will be indicated by the status LED on the base circuit board (Figure 4-2).
7. Secure the switch in position using the upper and lower jam nuts.
8. Raise and lower the mast several times, checking that the mast is plumb each time and adjust the switch if necessary.
9. Replace the cover.

Adjusting the Stow Proximity Switch

Before delivery of a new INFLEXION, all switches are properly set and tested and normally no switch adjustment is necessary. However, if the stow switch needs adjusted, like after the actuator was replaced, follow these steps to adjust the stow switch:

1. Make certain that the INFLEXION base is level.
2. Remove the base side cover.
3. Loosen the upper jam nut to lower the switch approximately 1/8".
4. Raise the mast to 90° by holding the "Mast Up" button until the mast is at 90°.
5. Hold the "Mast Down" button until the mast stows firmly into the saddle then release the "Mast Down" button.
6. With the mast stowed, carefully grasp the payload and attempt to slowly lift the payload off the saddle. If the saddle is not snug into the saddle, repeat steps 4 through 6 until the mast is firmly in the saddle.
7. Secure the switch in position using the upper and lower jam nuts.
8. Raise and lower the mast several times, checking that the mast is stowed each time and adjust the switch if necessary.
9. Replace the cover.

4.4 TROUBLESHOOTING

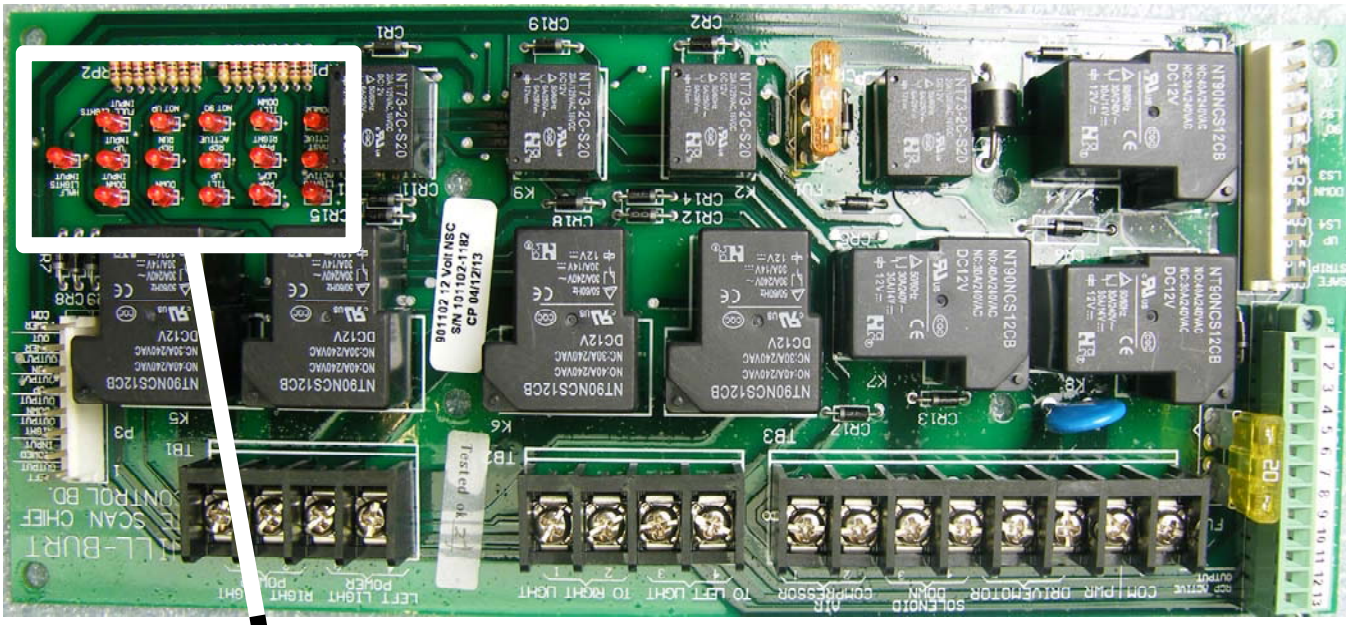
Refer to Table 4-1 troubleshoot INFLEXION issues.

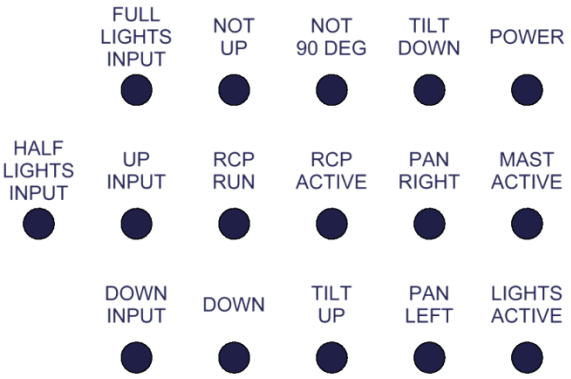
⚠ WARNING

WARNING: Only trained and qualified personnel should install, adjust, service and use INFLEXION.

⚠ WARNING

WARNING: Before troubleshooting, read the operating instructions and the safety summary. Always obey the warnings in the operating instructions.





LED	Definition
Power	12V is at the base board
Mast active	Mast is out of the saddle
Lights active	Mast is at 90°
Tilt Up or Down	Not Used
Pan Right or Left	Not Used
Not 90 Deg	Mast is not at 90°
RCP active	Not Used
Not up	Always lit when the mast is at 90°
RCP run	Not Used
Down	Not Used
Full lights	Not Used
Up input	Mast up key pressed
Down input	Mast down key pressed
Half lights	Not Used

Figure 4-2 Status LEDs on Base Board

PROBLEM	CAUSE	EVIDENCE
Actuator is not functioning at all.	Blown fuse FU1 or FU2 on circuit board.	No status LEDs are lit on the control board.
	MAST UP/DOWN switch in remote Operator Station is defective.	Neither the “UP INPUT” nor the “DOWN INPUT” status LEDs light when the corresponding switch is activated.
	Actuator is defective.	Contact Customer Service.
Actuator is not functioning properly in the UP direction.	MAST 90° limit switch is misadjusted or defective.	The “NOT 90 DEG” status LED is not lighted.
	MAST UP switch in Remote Operator Station is defective.	The “UP INPUT” status LED does not light when the switch is activated.
Actuator is not functioning properly in the DOWN direction	Magnetic (MAST RETRACTED) limit switch is misadjusted or is defective.	The “NOT 90 DEG.” Status LED is not lighted.
	MAST DOWN switch in remote Operator Station is defective.	The “DOWN INPUT” status LED does not light when the switch is activated.

Table 4-1 Troubleshooting Table